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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PROCTOR, JASON SCOTT	
ART UNIT	**PAPER NUMBER**
2123	

DATE MAILED: 05/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/707,448	PIPPIN, JACK D.	
	Examiner	Art Unit	
	Jason Proctor	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-11 and 13-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-11 and 13-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/15/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 3-11 and 13-21 were rejected in the previous Office Action. Applicants' response of 24 March 2006 has amended claims 3, 13, 14, and 20. Claims 3-11 and 13-21 have been submitted for reconsideration.

Claims 3-11 and 13-21 are rejected.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 15 March 2006 was filed after the mailing date of the non-final Office Action on 30 January 2006. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

The Examiner thanks Applicants for addressing the previous objections to the claims. Those objections have been withdrawn.

The Examiner thanks Applicants for clarification of the language in claim 7. However, this clarification has established that claim 7 does not recite any limitation which defines the invention. Claim 7 merely recites additional functional language describing "the threshold adjustment logic." While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. Please see MPEP 2114.

It is further noted that claim 6 recites "threshold adjustment logic" and describes this feature in terms of functional language. As in claim 7, this functional language cannot be properly interpreted as defining the invention. The effective limitations of claim 6 are there "The integrated circuit of claim 5 further comprising threshold adjustment logic." Claim 7 effectively recites the same.

Claims 6 and 7 are neither rejected nor objected for the reasons stated above. The Examiner merely intends to draw Applicants' attention to a broad, reasonable interpretation of these claims to facilitate comparison to the prior art. Similar analysis is appropriate for the functional language of claims 3, 4, and 8-11.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 3-11 and 13-21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent No. 5,287,292 to Kenny et al. (hereafter referred to as Kenny) in view of US Patent No. 4,602,872 to Emery et al. (hereafter referred to as Emery).

Regarding claims 3, 10, 13, 14, and 20, Kenny teaches an integrated circuit comprising a single thermal sensor to generate a temperature value, a stored threshold value, and interrupt logic and generating an interrupt if the temperature value exceeds the stored threshold value [*"the temperature of an integrated circuit is regulated using a conventional temperature monitor and a novel power user regulator"* (column 1, lines 51-64); regarding **thermal sensor**, *"a temperature dependent resistor 501 would be mounted near the circuit to be mounted"* (column 9, lines 38-52); regarding **interrupt logic** and **threshold value**, *"When the temperature as indicated by a signal on line 505 reached a trigger value the power use regulator 502 would activate"* (column 9, lines 38-52); regarding **generating an interrupt**, *"The power use regulator might simply force the integrated circuit to low clock speed operation as long as the temperature is high,"* (column 9, lines 38-52) where an internal computer signal to communicate with other peripheral devices, such as controlling clock speed, is an interrupt].

Kenny does not expressly suggest using **a plurality of thermal sensors** or **an averaging mechanism** as recited by the claim.

Emery teaches a temperature monitoring system for an electric generator, including specific teachings applicable to monitoring complex systems. In particular, Emery teaches **a plurality of thermal sensors** [*"a plurality of temperature sensors are positioned... to derive respective signals indicative of the temperature of* [components of the electric generator]"

(column 2, lines 17-26)] and **calculating an average temperature from the plurality of sensors** [*"the signals from all of the sensors are combined to derive an average"* (column 2, lines 17-26)].

Emery expressly provides motivation for averaging the values from a plurality of temperature sensors [*"a temperature sensor during a malfunction may provide an abnormally high reading from its previous normal reading, however such condition will go undetected* [in the prior art]. *The present invention provides for an improved temperature monitoring system for such generator wherein early detection of an abnormally hot stator coil is made possible"* (column 2, lines 2-14). In more detail, Emery teaches comparing each individual sensor reading against the average sensor reading, thereby determining "how far from average" each reading is rather than merely determining "how hot" each reading is, and thus producing a more reliable measure of heat in the device (column 2, lines 27-54)].

As with Kenny, Emery teaches a **threshold temperature** and generating an alarm if the threshold temperature is exceeded, directly analogous with generating an interrupt in a computer processor [*"Each of the generated percentage indications may be compared with first and second alarm limits to appropriately notify the operator should either of the alarm limits be exceeded"* (column 2, lines 50-53)].

A person of ordinary skill in the art of thermal management and integrated circuit design, at the time of Applicants' invention, would have found it obvious to combine the teachings of Kenny, to vary the clock speed of an integrated circuit in response to a measured temperature measurement in order to manage heat in the circuit, with the teachings of Emery, to average a plurality of temperature readings and thereby produce a more reliable measure heat in the device.

The combination could be achieved by replacing the single temperature sensor connected to the *power use regulator* (Kenny, *id.*) with a plurality of temperature sensors and calculating an average of the readings from the temperature sensors (Emery, *id.*).

Although Emery contemplates electric generators, the teachings relied upon in this rejection are directed toward thermal control of an electrical device. A person of ordinary skill in the field of thermal control in integrated circuits, when looking to the prior art for teachings of thermal control systems, would know and understand the applicability of thermal control to various electrical technologies and would therefore look beyond the narrow confines of thermal control in integrated circuits. For this and other reasons, the teachings of thermal control in Emery are regarded as analogous art to the application of thermal control systems in integrated circuits.

Where claims 10 and 20 refer to **displaying information regarding the calculated average**, Emery expressly teaches generating alarms (column 2, lines 50-53) and alarm checks coupled to a display (FIG. 5B, references 112, 116, 108; *"Display apparatus 108 is provided in order to present... the results of the computation of percent of average coil temperature performed by circuit 102... If either of these* [warning limits] *are attained, such indication may be displayed such as by flashing the particular value or by a change in color, if the display apparatus includes a color monitor"* (column 8, lines 11-28)]. In forming the combination above, in light of the teachings of Emery regarding the display of alarms, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to include the display features taught by Emery in order to alert a user of the integrated circuit that a

temperature threshold was surpassed, for example to prompt the user to adjust the usage of the integrated circuit and lower the measured temperature.

Where 14 and 20 define methods performed by the apparatuses of claims 3 and 10, these methods are performed by the combination formed above.

Regarding claims 4 and 15, Kenny expressly teaches adjustment logic to decrease a clock frequency in response to a signal indicating that the threshold temperature has been exceeded [*"The power use regulator might simply force the integrated circuit to low clock speed operation as long as the temperature is high,"* (column 9, lines 38-52)].

Regarding claim 5, wherein the **register is programmable by the integrated circuit**, Emery expressly teaches that the alarm limit values (*stored threshold values*) may be, "by way of example," 3.0° C and 6.0° C (column 8, lines 46-49). Emery expressly suggests methods of calculating the alarm limits (column 8, lines 24-45). Emery clearly conveys to one of ordinary skill in the art that the alarm limit values (*stored threshold values*) should be adjusted to suit the needs of the application; that is, the means for storing or representing the alarm limit values (*register*) should be configurable or programmable. Thus, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention in the formation of the combination above in order to adjust the threshold values to suit the needs of a particular application.

Regarding claims 6-7, 11, 16-17, and 21, wherein **threshold adjustment logic** is used to **program the register to a different** (and **second different**) threshold temperature in response to an interrupt indicating that the threshold (and first threshold) temperature has been exceeded, these limitations construct a system where two signals are generated as the temperature exceeds a first and subsequently a second threshold, which is expressly taught by Emery [*"an alarm check circuit 112 is provided and is operable to compare each value provided by circuit 102 with a first or warning alarm limit, as well as with a second or shut down alarm limit"* (column 8, lines 11-28)]. The distinction between reprogramming a single threshold versus predetermining two distinct thresholds is considered an equivalent solution that would have been obvious to a person of ordinary skill in the art. In forming the combination above, it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to incorporate the concepts of Emery regarding the use of two thresholds in order to create a graduated thermal control system, such as one with a "warning" stage and a more critical "shutdown" stage (see Emery, column 8, lines 30-45).

Regarding claims 8 and 18, wherein the clock adjustment logic is used to **control the temperature of the integrated circuit by increasing and decreasing an integrated clock frequency**, this limitation is expressly taught by Kenny [*"The power use regulator might simply force the integrated circuit to low clock speed operation as long as the temperature is high... The circuits would operate as long as the temperature monitor indicated high temperature, but would deactivate and reset* [restoring high clock speed] *when the temperature fell to an acceptable level"* (column 9, lines 38-52)].

Regarding claims 9 and 19, Emery teaches a "shutdown" threshold (column 8, lines 30-45) which would convey to a person of ordinary skill in the art a teaching that there exists some temperature threshold which, when exceeded, should indicate that the system being monitored should be halted. Further, Official Notice is taken that halting a computer component to conserve power or dissipate heat is old and well-known in the art (See US Patents 4,851,987 to Day; 4,204,249 to Dye et al.; 5,025,387 to Frane; 4,823,292 to Hillion; 5,189,647 to Suzuki et al.; among others). Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Kenny and Emery, as cited above, and to incorporate the old and well-known method of halting a computer processor or component in order to conserve power or dissipate heat.

Response to Arguments – 35 USC § 103

In response to the rejections above, Applicants argue primarily that:

> As conceded in the official action, Kenny et al. merely teach a single thermal sensor and that the sensor is mounted near the circuit to be monitored. That is, the thermal sensor of Kenney et al. is not placed across or on the circuit to be monitored.

The Examiner respectfully traverses this argument as follows.

The Examiner presumes that Applicants' argument refers to the recited claim language:

> "a plurality of thermal sensors each placed in one of a plurality of different locations across the integrated circuit" (claim 3)
> "a plurality of thermal sensors each placed in one of a plurality of different locations across the integrated circuit" (claim 10)
> "sensing temperature at a plurality of different locations across an integrated circuit" (claim 14)
> "sensing temperature at a plurality of different locations across an integrated circuit" (claim 20)

The Examiner has found no claim language directed to placing thermal sensors "on the circuit."

The Examiner understands Applicants' argument to rely upon the distinction between the claimed arrangement ["*across the integrated circuit*"] and the teachings of the prior art in Kenny et al. [*"a temperature dependent resistor 501 would be mounted near the circuit to be monitored"* (Kenny, column 9, lines 41-43)]. This distinction amounts to little more than the differences between the prepositions *across* and *near*, and in light of the broadest reasonable interpretation of the claim language in light of the specification.

The American Heritage College Dictionary, Fourth Edition, defines:

across *prep.* **1.** On, at, or from the other side of: *across the street.* **2.** So as to cross; through: *drew lines across the paper.* **3.** From one side of to the other: *a bridge across a river.* **4.** Into contact with: *came across my old friend. adv.* **1.** From one side to the other. **2.** On or to the opposite side. **3.** Crosswise; crossed. **4.** So as to be comprehensible or successful: *put our idea across.*

near *adv.* 1. To, at, or within a short distance or interval in space or time. 2. Just about; almost; nearly. 3. With or in a close relationship. [*adj...*] *prep.* Close to. [*tr...* *intr...*]

Therefore, although the claims do not expressly recite "on the integrated circuit," it may be reasonable to make that interpretation through definition 4 of the preposition. Under appropriate circumstance, it would be reasonable to regard the terms *on* or *at* as synonymous with "into contact with."

However, the term *near* would lead a reasonable person to the same interpretation of "into contact with." Where the prior art teaches placing a component *near* a second component,

a reasonable person would interpret that the preferable way to comply with that teaching is to place the first component "into contact with" the second component. Such an inference would depend upon the application, however as will be shown this conclusion is perfectly reasonable regarding the claimed invention.

It is well known that heat is a radiant energy that dissipates through transmission over distance. A hot stove will cause burns if it is touched but will provide gentle heat at a safe distance. Therefore, a person wishing to measure the temperature of the hot stove, that is, a person interested in the scientific measure of the stove's precise temperature, is not motivated to measure the heat felt from a safe distance. That person would take appropriate steps to measure the heat radiated by the stove at a distance that is as *near to the stove as possible*. When measuring radiant heat, it is well known that the measurement should take place *as near as possible* to the heat source.

Therefore, a person of ordinary skill in the art of thermal management, when reading the teachings of Kenny et al. to employ *"a temperature dependent resistor* [...] *mounted near the circuit"* would understand that it is preferable to mount the sensor [*"temperature dependent resistor"*] *as near as possible* to the integrated circuit. Preferably, the sensor should be placed "into contact with" the circuit, in direct accordance with the ordinary definition of *across*. Therefore, a person of ordinary skill in the art would interpret the teachings of Kenny et al. as expressly suggesting Applicants' interpretation of the claimed terminology "across the integrated circuit."

Further, to reinforce the bounds of a reasonable interpretation of the claim language in light of the specification, the teachings of the specification must be considered.

> In a preferred embodiment of the present invention, the programmable thermal sensor 100 is located in the middle of the die of microprocessor 700 so as to provide the best thermal sensing. However, placement of the programmable thermal sensor in the middle of the die increases noise in the microprocessor. In an alternative embodiment, several thermal sensors are placed across the microprocessor die. In this configuration, each thermal sensor provides an interrupt when attaining the threshold temperature, and an average temperature is calculated based on the several thermal sensors. (specification, page 22, lines 14-21)

The specification teaches at least two embodiments. The first embodiment is characterized in part by locating the thermal sensor *in the middle* of the microprocessor, however this creates undesirable noise in the microprocessor. The second embodiment, *in contrast to the previous embodiment*, places a plurality of thermal sensors *across* the microprocessor die. Looking back to the ordinary definition of the term *across*, it is clearly reasonable to interpret Applicants' specification as teaching the placement of thermal sensors "in contact with" but not "in the middle of the microprocessor." Therefore it would be reasonable to interpret the specification as teaching thermal sensors that are *near the microprocessor*, especially *as near as possible*, i.e. "into contact with" the microprocessor.

In contrast, the specification does not appear to contain any express teaching that requires that the thermal sensor be incorporated into the structure of the microprocessor itself. Such a teaching, if it exists, may reasonably exclude the interpretation of *near* the microprocessor.

The Examiner acknowledges that the terms *across* and *near* may not be entirely synonymous depending on usage and context. However, it is clear that the specification and claim language does not sufficiently distinguish Applicants' invention from what the prior art references would suggest to a person of ordinary skill in the art.

Applicants further argue that:

> Second, the Emery et al. patent is from a non-analogous art as it is directed to monitoring the temperature of an electric generator. Electric generators do not present the same problems in temperature management as do ICs.

The Examiner respectfully traverses this argument as follows.

Although Emery contemplates electric generators, the teachings relied upon in this rejection are directed toward thermal control of an electrical device. A person of ordinary skill in the field of thermal control in integrated circuits, when looking to the prior art for teachings of thermal control systems, would know and understand the applicability of thermal control to various electrical technologies and would therefore look beyond the narrow confines of thermal control in integrated circuits. For this and other reasons, the teachings of thermal control in Emery are regarded as analogous art to the application of thermal control systems in integrated circuits.

Applicants' arguments have been fully considered but have been found unpersuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason Proctor
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